

CAN BIRDS THAT LIVE ON  
SWINE FEEDLOTS ACT AS RESERVOIRS OF TRANSMISSION  
OF SWINE FLU?

Submitted by  
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## ABSTRACT

A review of research in the area of interspecies transfer of type A viruses seemed to indicate that birds could contract swine flu, acquire immunity, and then pass it on to swine. Birds were captured from swine feedlots, that had previous swine flu outbreaks, and were checked for immunity to swine flu viruses. None of the captured birds had immunity to swine flu. Further research is warranted on this type of interspecies transfer because of the monetary losses due to the disease.

## INTRODUCTION

Swine flu is mainly a fall, winter, and early spring affliction that affects the respiratory tracts of pigs.

Swine flu can hit a whole herd at once, or be restricted to only one or two individuals in that herd. Whole herds can become ill, but show no signs of infection (Dunne and Leman 1975). The last two statements point out the variability in severity and breadth of infection. One interesting note is that when one swine farm in an area gets infected, it seems that other farms in neighboring areas get outbreaks of swine flu also.

It is important to find out if there is a second host of swine flu because of the indirect monetary losses caused by the virus. Adult swine lose weight and do not eat well while they are sick. Mortality for adults is one to three percent, but is somewhat higher in piglets (Dunne and Leman 1975).

Most swine feedlots here in Ohio have some birds that frequent these farms. The birds can range in number from ten to twenty or upwards of a few thousand per farm. Due to the close proximity between birds and swine the possibility exists that swine flu virus could infect birds. Flu viruses in swine are spread by an aerosol condition that exists when an animal sneezes. Work by Slemons and Easterday (1977) has shown that inhaled viruses could live in the digestive tract of birds. Birds would acquire immunity to the virus, and also be spreading viruses in their feces.

The evidence for interspecies transfer is scanty but it has been documented occasionally. Hong Kong flu from 1968 (H3N2) was found to be a particularly transferable subtype. It infected swine (Kilbourne 1975), chickens (Beveridge 1977), calves, dogs, and some seabirds. Webster and Campbell infected pigs, turkeys, and chickens at the same inoculation with two viruses (Kaplan and Webster 1977). Viruses used were endemic in each species. So, for example, a chicken would be infected with a chicken virus

and with either a swine or turkey virus. Recombinants were formed and were experimentally infective (Beveridge 1977).

The purpose of this project was to determine whether birds that frequent swine feedlots can contract swine flu, acquire immunity to it, and act as reservoirs of the disease.

## METHODS AND MATERIALS

### Bird Capture

The birds used in this project were captured with mist nets. Nets were placed in the birds' flight path to and from the swine feeding sheds. Captured birds were removed from the net alive and taken back to the lab where blood samples were obtained. Birds were captured from the following locations. The names are those of the people granting permission to net the birds.

- 1) West Branch OARDC  
South Charleston, Ohio route 41  
Steve Stitzlein
- 2) Orleton Farms  
Route 29 between Mechanicsburg and Urbana, Ohio  
Dr. Warren Amling
- 3) Gerald Jerew's Farm  
2416 route 203, 1 mile south of Greencamp, Ohio  
Gerald Jerew
- 4) Ohio State University (control)  
Howlett Hall  
Dr. Thomas Townsend

The captured birds were taken to the lab and blood samples were taken. The sera was obtained and made ready for treatment. Receptor destroying enzyme (RDE) was used on the sera samples to destroy nonspecific inhibitors. The preceding treatment and the ones following are taken from the lab manual Immunology series no. 6 (U.S. Department of Health, Education, and welfare 1975).

### The Hemagglutinating Inhibition (HI) Test

Chicken red blood cells (RBC) were separated and then suspended to make a 4% solution. This solution was standardized using a spectrophotometer to obtain a 0.5% suspension of RBC.

The stock viruses were titrated so that the solution has the necessary four hemagglutinating units per 0.025 ml of solution. This must be double checked by back-titrating the stock viruses. This ensures that the solution containing viruses has four hemagglutinating units per 0.025 ml.

while running the HI test, immunity was checked against four viral variants: A/Turkey/Wisconsin/66, A/Turkey/Wisconsin/68, A/Hong Kong/68, and A/Swine/wisconsin/67.

### RESULTS

For the first three sites, nets were set up in a flight path, and birds were caught in late afternoon (2-6 PM) during their final feeding times of the day. Birds caught on campus were captured at 7 AM. They were scared from their roosts, in a row of bushes, into the nets. All birds that were captured on swine farms were seen feeding in and amongst the pigs, and most of the birds roosted in rafters of swine sheds.

None of the birds showed any immunity to the four viruses. Sparrows (Passer domesticus), and starlings (Sturnus vulgaris) are the two most common birds found on swine farms (Table 1). The W. branch of OARDC had a sparse population of scattered birds, and the only birds caught were horned larks (Eremophila alpestris). Horned larks did feed in the swine sheds, but did not roost in the sheds.

Table I. Number of Birds Captured by Site

Capture location	Number of birds caught by species
w. branch OARDC	3 horned larks
Orleton Farms	18 house sparrows 11 starlings
Gerald Jerew's Farm	33 house sparrows 3 starlings
OSU Control	13 house sparrows 1 starling 2 cowbirds
	84 birds sampled

#### DISCUSSION

My results show that birds do not acquire immunity to swine flu virus and do not act as reservoirs for the disease. This is the conclusion I reached from my data. There could be experimental error introduced that may account for unreliable results. Following are four sources of possible error that I feel would have made the data unreliable:

- 1) The stock viruses may be too old and the current strains of viruses may have drifted too far to be picked up in the HI test.
- 2) Not enough birds were sampled.
- 3) Immunity in birds to swine flu may be very short term and not picked up in the HI test.
- 4) Sampling may have been done too long after an outbreak of swine flu and all the carriers had already died.

with more in depth research I could determine whether any of the sources of error are actually acting, and then be more sure of the results.

Even though I obtained negative results I feel there is strong enough antigenic evidence to warrant further research. Birds have many H and N antigens closely related to viral subtypes found in swine, equines, and humans (Beveridge 1977). All the swine antigens are directly related to avian antigens (Kaplan 1977). This seems to indicate that somewhere in history birds have transmitted their viruses to mammalian groups, swine in particular. Humphreys (1976) believes that when dealing with avian influenza the possibility of recombination and mutation are ever present and could give rise to a new pathogenic subtype that is infective to any mammalian group. This evidence suggests that it is highly possible that birds could contract swine flu virus. The amount of research in the area of avian influenza and its transfer between species is rather limited and more research is definitely needed in the future.

Other methods of swine flu transfer may be operating that do not create immunity in the birds. The birds may have ingested the virus, flew to another farm, and passed the virus in their feces. This method of viral transfer would not require the bird to contract the disease or obtain immunity to the disease. Slemons and Easterday (1977) have already shown that birds can harbor viable viruses within their digestive tracts. Viruses may propagate in the digestive tract without the bird acquiring immunity. Nasal and cloacal swabs should be checked to test the last two possibilities.

The birds' feet should also be checked for viable viruses. Possibly, the viruses are picked up on the birds' feet while they are walking in a feeding shed, and then carried to another farm. Humans should be checked for this type of transfer also.

The need for further research in this area and interspecies transfer in general is needed. Studies on interspecies transfer between swine and birds may lead to findings on transfer between other livestock and birds, and also man. The transfer of swine flu from swine to man cost the US government \$100 million in appropriations for vaccine (Beveridge 1977). Research on the topic of interspecies transfer may put an end to such large outlays of money, and also gives researchers a handle on controlling pandemics and epidemics of flu.



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